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IP-Based Relay Services
using the Telcordia
Service Interconnection Registry

Prepared for:

VRS IMG

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Outline

- Telcordia Service Interconnection Registry Overview

- Proposed IP-Based Relay Services Solution

- Pricing

- Implementation Timeline

- Telcordia Qualifications

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Telcordia Approach

- Deploy a timely, cost-competitive solution to meet core VRS needs

  - ❖ Telcordia solution meets all VRS Centralized Database system requirements

  - ❖ Leverage existing industry processes (E911, Number Assignment, Number Portability) and Telcordia® Routing Administration (TRA) expertise

- Prudent evolution of capabilities

  - ❖ Establish and work with VRS User Group to guide new solution capabilities

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Telcordia Service Interconnection Registry

- Secure, centrally-managed, carrier-grade routing data source for IP-enabled services and applications

- At a fundamental level, maps Telephone Numbers (TNs) to IP Addresses or Uniform Resource Identifiers (URIs) to reach destination gateways/switches/end users

- Multi-level data validation capabilities

- Fully-integrated use of LERG™ Routing Guide and NPAC number portability data to verify the assignee of TNs

- GUI/Batch File/Programmatic input options

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Solution Assumptions

- VRS Providers supply the NANP numbers to the central Database for their VRS Users

- A validation process ensures that VRS User-to-Provider mappings in the Central Database are authoritative

- VRS Providers internally maintain their own VRS User lists to limit privacy concerns

- Initially, VRS Providers internally maintain the current IP addresses of their VRS Users

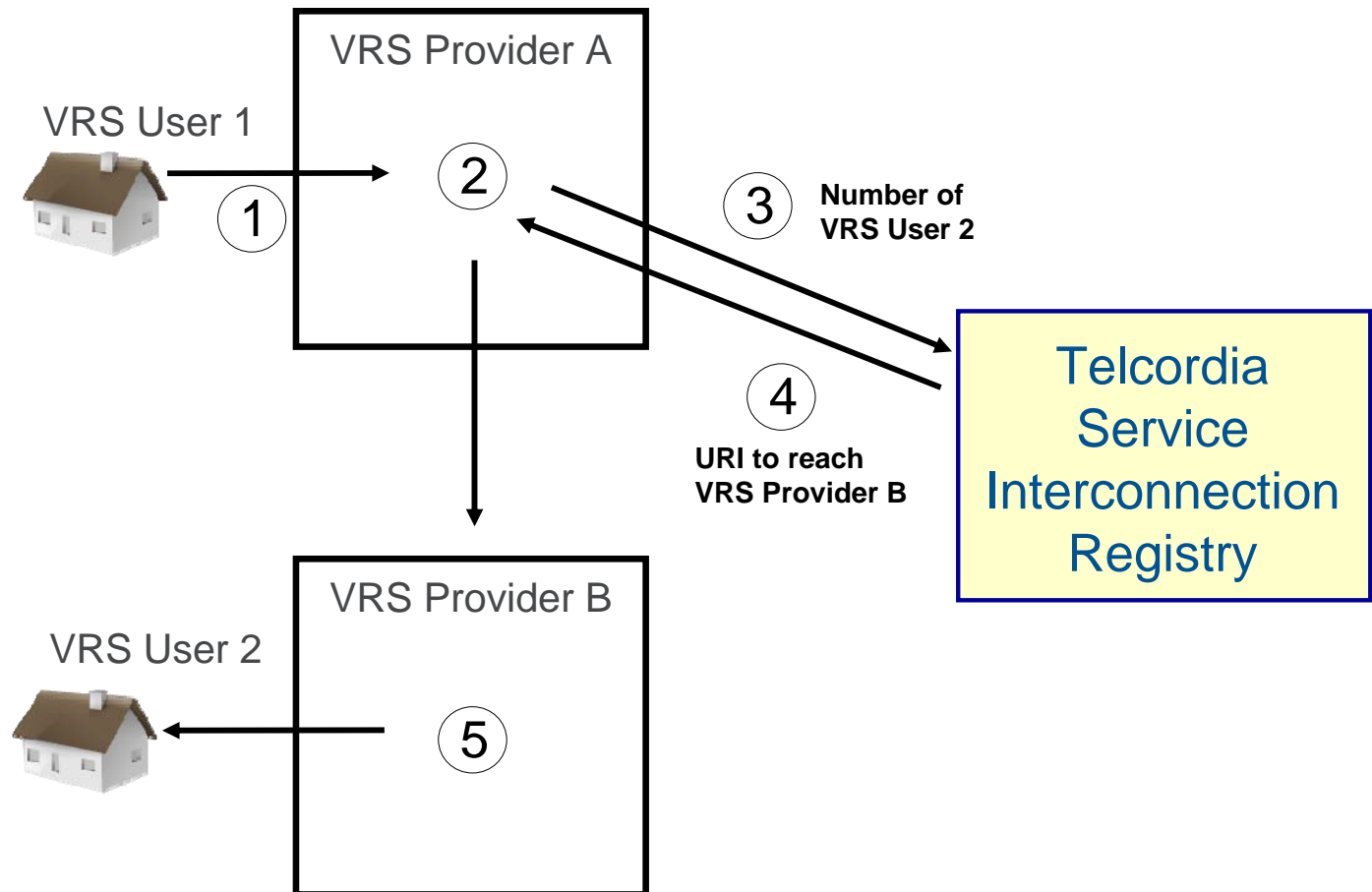- Evolution to centrally available VRS User IP addresses may occur in the future

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Solution Assumptions (Cont'd.)

- Only authorized VRS Providers query the Centralized Database to ensure information security

- Centralized Database identifies the entry point URI of VRS Provider to which the call must be routed for completion

- A Telcordia-moderated VRS (Provider) User Group will track issues to resolution and guide the development of new capabilities

- Telcordia will work with a designated (TBD) Oversight Committee

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Call Flow Example 1 – VRS User to VRS User

Call Flow:

1. VRS User 1 dials number of VRS User 2

2. VRS Provider A consults its local database and determines VRS User 2 is not a customer

3. VRS Provider A queries Telcordia Service Interconnection Registry

4. VRS Provider A uses the returned URI to route call to VRS Provider B

5. VRS Provider B consults its local database and establishes call to VRS User 2

VRS Provider A

VRS User 1

② ③ **Number of VRS User 2**

①

④ **URI to reach VRS Provider B**

Telcordia Service Interconnection Registry

VRS Provider B

VRS User 2

⑤

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Call Flow Example 2 – Hearing Caller to VRS User

Hearing Caller

Call Flow:

1. Hearing Caller dials 800 number of VRS Provider A and requests call to VRS User

2. VRS Provider A consults its local database and determines VRS User is not a customer

3. VRS Provider A queries Telcordia Service Interconnection Registry

4. VRS Provider A uses the returned URI to route call to VRS Provider B

5. VRS Provider B consults its local database and establishes call to VRS User
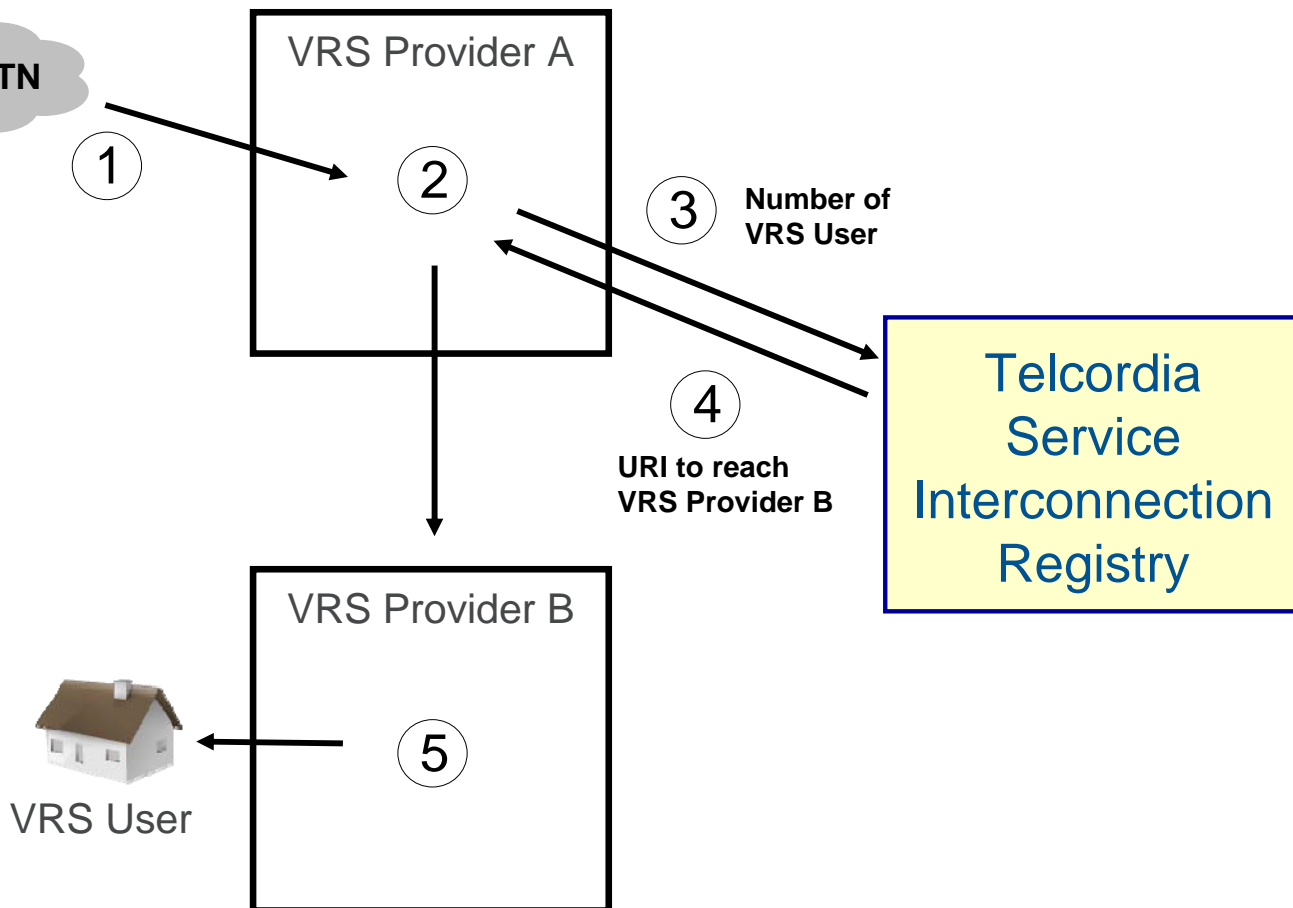
PSTN

VRS Provider A

① ② ③ **Number of VRS User**

④

URI to reach VRS Provider B

Telcordia Service Interconnection Registry

VRS Provider B

VRS User ⑤

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Call Flow Example 3 – Hearing Caller to VRS User

Hearing Caller

PSTN

VRS Provider A

① ②

VRS User

Call Flow:

1. Call from Hearing Caller to VRS User is forwarded via PSTN to VRS Provider A

2. VRS Provider A consults its local database and determines VRS User is a customer and completes call
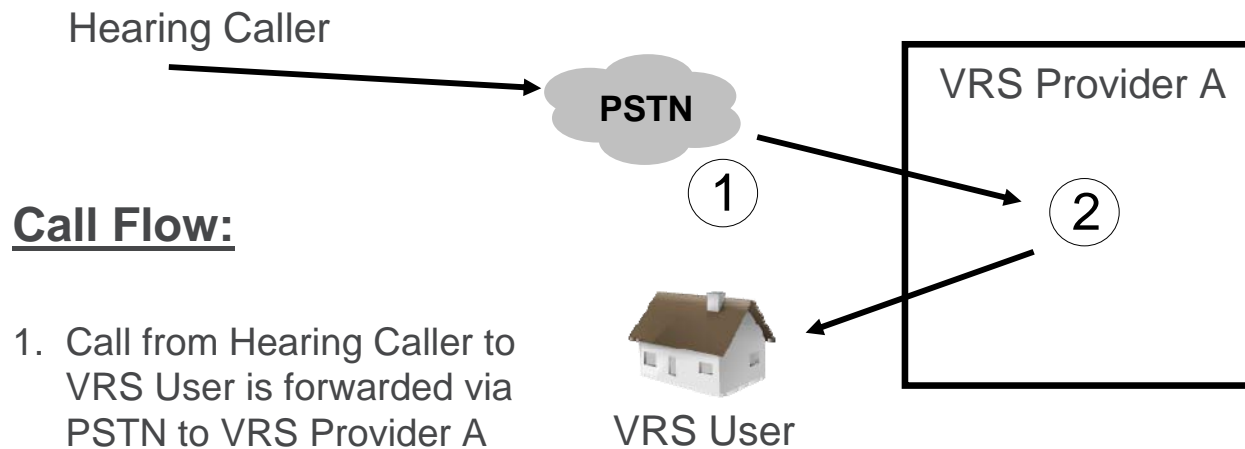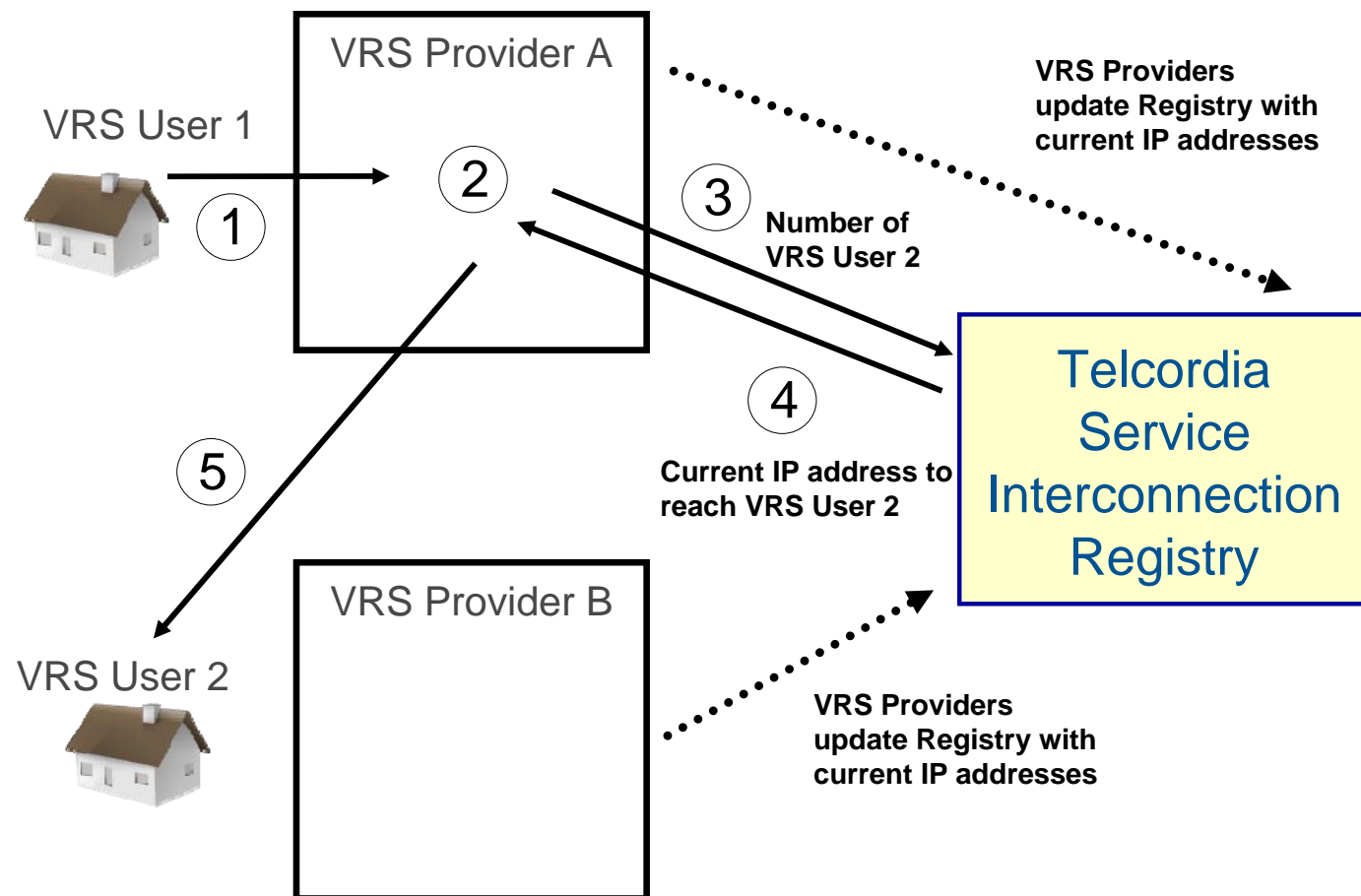
Since VRS User is a customer of VRS Provider A, no query to Centralized Database is necessary

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Call Flow Example 4 – VRS User to VRS User
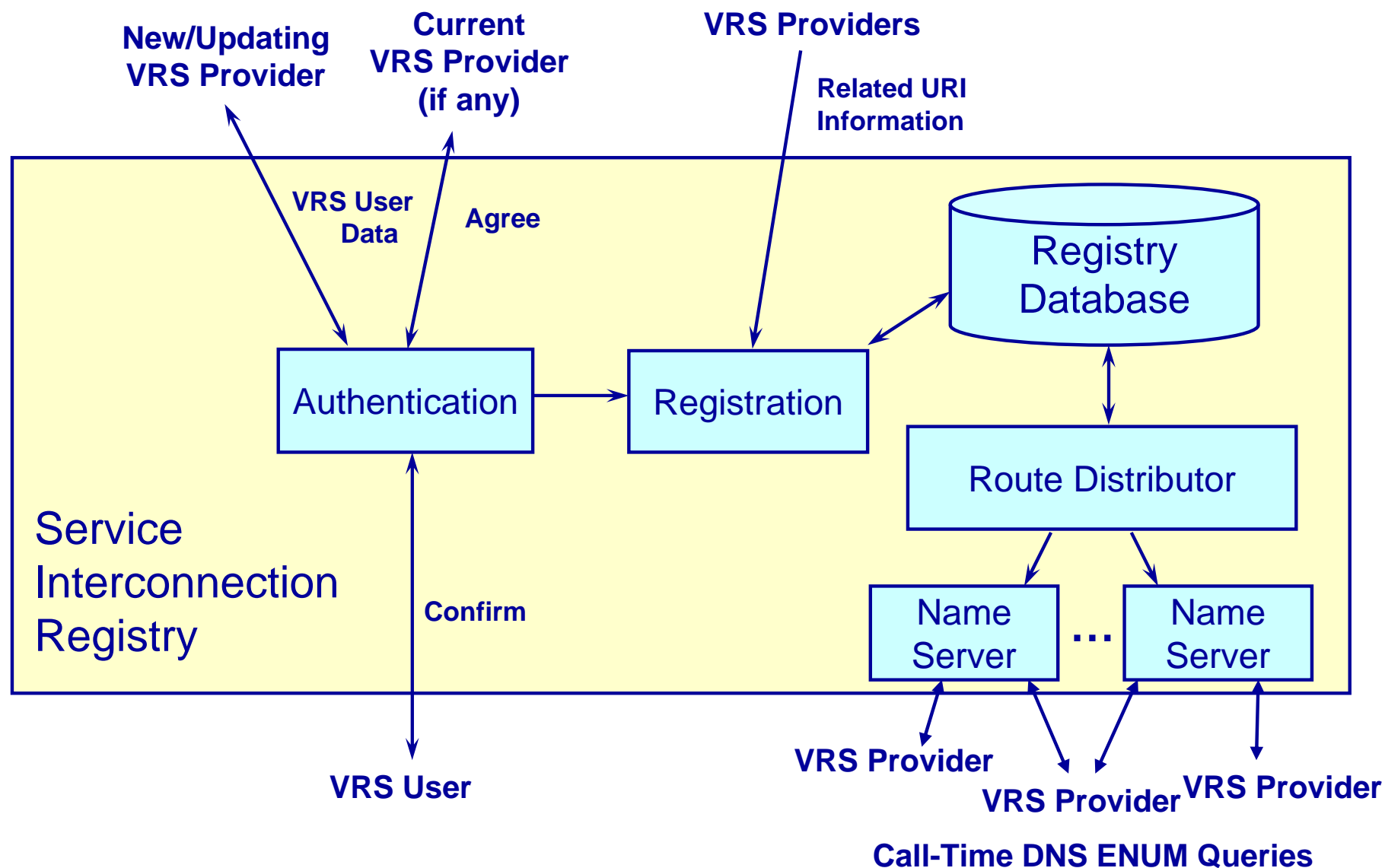## *Future Evolution*

Call Flow:

1. VRS User 1 dials number of VRS User 2

2. VRS Provider A consults its local database and determines VRS User 2 is not a customer

3. VRS Provider A queries Telcordia Service Interconnection Registry

4. Telcordia Service Interconnection Registry returns current IP address of VRS User 2

5. VRS Provider A uses the returned IP address to route call directly to VRS User 2

VRS Provider A

VRS User 1

VRS Providers update Registry with current IP addresses

Number of VRS User 2

Telcordia Service Interconnection Registry

Current IP address to reach VRS User 2

VRS Provider B

VRS User 2

VRS Providers update Registry with current IP addresses

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Solution Overview

- Telcordia is Neutral Party to allow "*all VRS consumers to be able to place a VRS call through any of the VRS providers' service, and all VRS providers to be able to receive calls from, and make calls to, any VRS consumer*"

- Based on Telcordia's established Service Interconnection Registry

    - ❖ Central Registry Database

    - ❖ Name Servers for Call-time Queries (DNS ENUM and/or SIP Redirect)

- Use regular 10-digit TNs for VRS Users

    - ❖ Ported or non-ported

    - ❖ Assigned by a LEC, a VRS Provider, or some other agent (potentially Telcordia as a complementary service)

- Leverage E911 solutions currently used for Wireless & VoIP

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Proposed Solution Architecture

New/Updating VRS Provider

Current VRS Provider (if any)

VRS Providers

Related URI Information

VRS User Data

Agree

Registry Database

Authentication

Registration

Route Distributor

Service Interconnection Registry

Confirm

Name Server

...

Name Server

VRS User

VRS Provider

VRS Provider

VRS Provider

Call-Time DNS ENUM Queries

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Solution Overview - Authentication

- VRS Providers supply a VRS User's assigned TN for registration into the Central Database (including an effective date/time)

- If a new VRS User, VRS Provider performs a registration "Add"

- If a VRS User drops service, VRS Provider performs a registration "Delete"

- If a VRS User wants to change VRS Providers, Telcordia will leverage its global Number Portability Clearinghouse technology and expertise to:

  1. Receive new VRS Provider input registration "Change Provider" request

  2. Request agreement from current VRS Provider based on a time interval

  3. On confirmation from current VRS Provider or end of time interval, process new VRS Provider registration "Change Provider" request

  4. If current VRS Provider is not valid or rejects "Change Provider," new VRS Provider receives notification to re-work the "Change Provider" request

- Authentication process verifies with VRS User for a new "Add" or "Change Provider" via an agreed upon method (e.g., e-mail)

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Solution Overview - Registration

- VRS Providers provide URI information for their routing gateways into the Central Database (including an effective date/time)

- VRS Providers register VRS Users' TNs into the Central Database and specify the associated URI for the designated routing gateway

  - Initial file upload for existing VRS Users

  - Existing Graphical User Interface (GUI) for ongoing registrations

  - An automated message interface can be established in the future

- Authentication of VRS Provider occurs before the registration is processed

- The registration data is validated:

  - TN is validated as a NANP number

  - URI for routing gateway must already be defined in the Database

- VRS Provider is sent a "Successful" response or an error(s) to fix

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Solution Overview – Route Distributor

- The Route Distributor performs following functions:
  - ❖ Scans the Central Registry database
  - ❖ Detects TNs that have activity now ("Add," "Change Provider," "Delete"), either immediate or previously scheduled by Effective Date/Time
  - ❖ Formats ENUM Resource Records and distributes to designated Zones in Name Servers

- Multiple Resource records optionally supported for a single TN:
  - ❖ Multiple Resource Record Types (e.g., NAPTR, A, AAAA, PTR, etc.) NAPTR with entry-point URI is the expected primary record type for VRS
  - ❖ Multiple service-specific NAPTRs (e.g., E2U+SIP, E2U+SMS, etc.) E2U+SIP is the expected primary service for VRS
  - ❖ Different services and record types can be mixed in the same zone or segregated into separate zones, for different query sources

- Can distribute to "mirror" site(s) or authorized VRS Provider-operated Name Servers. (Not currently assumed in the VRS architecture due to expressed privacy concerns)

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Solution Overview – Call-Time Queries

- The Name Servers perform the following functions:

  - ❖ Receive call-time DNS ENUM queries from VRS Providers' call-management devices

  - ❖ Search the Zone authorized for access by that call management device

  - ❖ Return the ENUM Resource Records for the TN from that Zone. Can return multiple service-specific records or record types, if desired

- Carrier-grade, geographically distributed Name Server architecture

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Estimated Telcordia Solution Cost

Telcordia proposes a non-transactional cost model that covers the following solution components:

1. Centralized VRS routing database system

2. Carrier-grade, hosted ENUM DNS (and/or SIP) query service

3. VRS user group coordination and facilitation

4. Interface to Oversight committee

One time start-up fee of $5-10K per VRS Provider, plus:

Number of TN Records in DB	Estimated Cost/Record/Month
0 – 75K records	$0.50 - $0.60
Next 75K records (Up to 150K)	$0.45 - $0.55
Next 150K records (Up to 300K)	$0.40 - $0.50

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Complementary Telcordia Services

On request, Telcordia can estimate the cost to provide services in the following potential areas:

1. Neutral third party administrator to provide telephone numbers to VRS Providers (and associated services as required)

2. Neutral third party administrator to provide telephone numbers directly to VRS Users (and associated services as required)

3. Systems engineering services to make E911 services more robust for mobile and remote VRS Users

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Implementation Timeline (~5 Months)

Task/Phase	Start	End
Contract Execution	Start	Week 2
Convene VRS User Group	Week 3	Week 5
Establish Governance Process	Week 3	Week 9
Execute contracts with VRS Providers	Week 4	Week 12
Incremental Solution Requirements	Week 6	Week 9
Telcordia Development	Week 8	Week 12
VRS Provider Development	Week 10	Week 15
Joint Solution Testing	Week 16	Week 18
Service Turn-up	**Weeks 19-20**	

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Telcordia Qualifications

- Telcordia has traditionally played a key role in helping support public policy objectives of the FCC

- Telcordia meets <u>all</u> neutrality requirements (Telcordia ® Routing Administration has been a trusted administrator of PSTN North American routing data for 25+ years)

- Telcordia meets <u>all</u> privacy requirements for database information

- Telcordia is proposing "<u>out-of-the-box</u>" solution components to meet expressed needs at a competitive cost

- Telcordia will leverage its global number portability leadership experience and technology

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